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DEMONSTRATION PROJECT ABSTRACTS
SOLID WASTES PROGRAM

NATIONAL CENTER FOR URBAN AND INDUSTRIAL HEALTH
CHEVY CHASE, MARYLAND

MARCH 1967

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DEMONSTRATION PROJECT ABSTRACTS

SOLID WASTES PROGRAM

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Environmental Control Administration
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Department of Health, Education & Welfare
Public Health Service
March 1967

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DEMONSTRATION PROJECT ABSTRACTS

SOLID WASTES PROGRAM

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Bureau of Disease Prevention and Environmental Control

National Center for Urban and Industrial Health

Solid Wastes Program, Chevy Chase, Maryland 20015

DISCRIMINATION PROHIBITED - Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Therefore, the programs discussed in this publication like every program or activity receiving financial assistance from the Department of Health, Education, and Welfare, must be operated in compliance with this law.

FOREWORD

Projects described in these abstracts have received awards covering up to two-thirds of project costs as authorized by the Solid Waste Disposal Act of 1965. The awards were made by the Solid Wastes Program of the Public Health Service's National Center for Urban and Industrial Health.

The projects are of two kinds. Some are designed to demonstrate the feasibility of new and improved technology for solid waste disposal. Others are to investigate the development of area-wide solid waste management systems to replace insanitary and uneconomic operations by individual communities.

The Solid Wastes Program, as outlined in the Act, is aimed at initiating across the Nation the adoption of practices and systems for disposing of solid wastes which protect human health and scenic beauty.

In addition to demonstration projects, the Program supports research and training in solid wastes management, provides up to 50 percent support for statewide solid waste program planning, and assists local and State governments with technical problems.

Project Type: Study/Invest/Demo. Grant Agency No. 1-D01-SW-00003-01

Title: Bagged Solid Waste Landfill Project

Project Director: Calvin A. Canney, Town Manager
Town Hall
Barrington, Rhode Island

Amount & Year: $30,830 - 01

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: To demonstrate the feasibility of rubbish and garbage disposal by the "bag system" in a sanitary landfill and to determine the effect of this collection method on the capacity of sanitary landfills.

Procedures: One-third of the population of Barrington will be converted to the "bag system." Detailed records of cost and failures will be kept. The bag will be used either strictly for garbage or for garbage and rubbish. The effect of these variables on sanitary landfill operations will be determined. Changes in the volume of collection and also the volume requirement in sanitary landfills due to the use of different "bag systems" will be determined by actual investigation. The degree of economy and advisability of using this method will be determined by evaluation of the data, and by assessment of public attitude.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00004-01

Title: Solid Waste Reduction/Salvage Plant

Project Director: John R. Reinhardt
Civil Engineer II
City of Madison, Engineering Department
Madison, Wisconsin

Amount & Year: $375,000 - 01 $90,000 - 02 $90,000 - 03

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: To make an economic study of the Gondard process of milling refuse as a means of reducing volume for the purpose of extending the life of a landfill. To evaluate the sanitary aspects of the milled refuse, economic feasibility of salvaging items such as paper and metal, use of milled refuse as a landfill cover, and investigate physical changes, in the condition of "milled" versus "as collected" refuse in the fill site.

Procedure: In the first year of the program a building will be erected and milling equipment will be installed. Landfill cells will be laid out, collection routes will be determined. Primary determinations will be made (1) to acceptability of using milled refuse in a landfill (2) to comparison of "in-fill" volumes and settlement characteristics (3) to cost of sanitary landfilling using "as-collected" and "milled" refuse (4) to evaluation of claims relative to rodents, insects, odor, dust and blowing litter (5) to comparison of traffic load-bearing characteristics of both types of sites (6) to study the effects of varying the mill grate mesh-size (7) to determine if milled refuse can be used as a cover material for demolition debris and non-grindable materials (8) to compare the gas production and bacterial content in both types of landfills (9) to observe the extent of anaerobic and aerobic decomposition in the second and third year of the project period operation, a landfill using milled refuse will be evaluated. Mesh-size of the optimum size will be determined. Economic determination will be made concerning salvable materials. Examination will be made of the landfill to determine if when covered with a minimal amount of topsoil, it will support vegetation and be suitable as a surface.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00005-01

Title: Solid Waste Disposal Study For Kalamazoo County - Michigan

Project Director: E. L. Bockstanz, Engineer Manager
Kalamazoo, County Road Commission
P.O. Box 2127, Kalamazoo, Michigan

Amount & Year: $12,000 - 01

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: To investigate and report on the feasibility of various disposal methods for Kalamazoo County. The firm of Jones, Henry and Williams will perform the entire study. They plan to determine the present and future quantities of household and industrial wastes, the possible location of disposal areas and the operating costs of the disposal systems.

Procedures: The consultant will endeavor to determine the combination of disposal method and disposal site that best relieves the solid waste disposal problems of Kalamazoo County. To determine the optimum solution, the consultant will use data accumulated by local agencies, aerial photographs, ground studies and subsurface investigations.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00006-01

Title: Hydrogeology of Solid Waste Disposal Sites

Project Director: Robert N. Farvolden, Assoc. Prof. Geology
Dept. of Geology, Univ. of Illinois,
Urbana, Illinois

Amount & Year: $71,297 - 01 $27,335 - 02

Started: June 1966 Expected Finish: May 1967

Objective: To define and study the geological factors that influence the movement of groundwater into, or leachate away from, landfill solid waste disposal areas.

Procedures: Several landfill sites will be selected for study in order to consider several different geological formations. Soil borings at and around the selected disposal sites will be used to define the geology of the disposal area. Piezometer tubes will be placed to define the groundwater movement through the area. After completely defining the geology and groundwater movement through the area, an attempt will be made to define the factors that have the greatest influence on the movement of the groundwater thru the disposal area. Water samples will then be collected and analyzed to confirm the ideas. The ultimate objective of the study is to develop the criteria with which to judge the groundwater pollution potential of a landfill when selecting a site.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00007-01

Title: Solid Waste Study and Planning Grant-Jefferson County

Project Director: Dr. John E. Heer, Professor
Civil Engineering
University of Louisville
Louisville, Kentucky

Amount & Year: $65,940 - 01

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: To investigate the composition and volume of solid wastes generated as well as the zones of generation. The methods of disposal most suited to the area and type of waste will be investigated, as well as possible sites for future disposal units.

Procedures: Jefferson County will be divided into three socio-economic areas; low, medium and high. The average family income for each area is less than $5,000; $5,000-$7,000; and more than $7,000 respectively. The amount and type of waste generated in each area will be determined by surveys. This data will be used to determine the type of disposal most suited for each area and to select possible future sites for solid waste disposal.

Project Type: Study/Invest/Demo. Grant Agency No. DO1-SW-00009-01

Title: High Density Landfill Recovery Program

Project Director: John Nicholson, Assistant Director
King County Sanitary Operations
Seattle, Washington

Amount & Year: $375,000 - 01 $71,008 - 02

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: King County proposes to demonstrate the feasibility of using a refuse burying compactor to create an economical sanitary landfill program that recovers and salvages land presently unusable. They will provide for long haul transportation in sanitary containers. These containers will be designed such that the refuse can be transferred directly into the compactor whereby it will be extruded below ground level at pressures up to 200 PSI. They hope to show the resultant landfill will be free of decay, gas producing products, and settlement.

Procedures: Under the direction of Hayes Evans, King County Sanitary Operations has designed and constructed the Transfer Stations, prepared designs for the transfer containers and the unloading yoke. By June 1967 they hope to have completed the engineering designs for the disposal machine. The 1967-68 program will involve the construction and demonstration of the disposal machine.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00010-01

Title: Waste Incineration in Mechanically Agitated Fluidized Beds

Project Director: Richard C. Bailie, Associate Prof.
Department of Chemical Engineering
West Virginia University
Morgantown, West Virginia

Amount & Year: $95,627 - 01 $80,800 - 02

Started: June 1, 1966 Expected Finish: May 31, 1968

Objective: To obtain a cleaner more economical method for the disposal of solid wastes using fluidized bed techniques. Special emphasis will be placed on garbage, rubbish, and sewage sludge.

Procedures: A pilot plant study of a fluidized bed will be made to obtain the data necessary for an evaluation of the process, to obtain operating experience, and to solve expected problems. This data will be used to develop an optimum design for several solid waste disposal problems. The following parameters will be studied:

a. Effect of varying the method of feeding including the feed composition.

b. Effect of changing certain bed characteristics.

c. Air Pollution control.

d. Chemical composition of influent and effluent.

e. Temperature of influent and effluent.

f. Heat Transfer.

g. Incineration of Sewage Sludge.

Project Type: Study/Invest/Demon. Grant Agency No. DO1-SW-00011-01

Title: Gully Reclamation Method - Landfill Demonstration - Nebraska

Project Director: John N. Nueberger, Gen Mngr.
Papio Watershed Board
Washington, Douglas & Sarpy Counties
Rm 220, Hilcrest Center, Ralston, Nebraska

Amount & Year: $72,300 - 01 $35,600 - 02 $35,600 - 03

Started: June 1966 Expected Finish: May 1969

Objective: To demonstrate and promote the acceptance of landfills for county-wide solid wastes disposal by utilizing the gully reclamation method.

Procedures: A gully in the Papio Watershed area of Sarpy County will be selected for a sanitary landfill site. Engineering studies will be conducted to determine the location for erecting a dam type structure, with a suitable spillway across the lower end of the gully. The dam and spillway will be erected with due regard to preventing landfill seepage from polluting the downstream waterways. Operation of the landfill will take place starting from the upstream end of the gully and progress toward the dam. The usual sanitary landfill appurtenances will be included such as access roads, scale and scale house, fencing gates, etc. Data on the amount, types of wastes materials, cover depth, compaction and settlement will be collected. Seepage water samples will be taken to determine the chemical and biological characteristics of internal drainage water.

Project evaluation would include: (1) findings on management and operation requirements to obtain community acceptance to the landfill methods employed; (2) determining landfill site costs, financing, and user rates for solid waste disposal; and (3) determining the value of gully reclamation by sanitary landfill operation in accomplishing conservation, controlling run-off channel grade, countryside beautification, and satisfactory solid waste disposal.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00013-01

Title: Multi-Purpose Incinerator - Connecticut

Project Director: Norman W. Wagner, Supervisor of Sanitation
Bureau of Sanitation, Magee Avenue
Stamford, Connecticut

Amount & Year: $800,000 - 01 $30,000 - 02

Started: June 1966 Expected Finish: May 1968

Objective: To demonstrate the practicability of burning bulk waste in a multi-purpose incinerator.

Procedures: Design and construct a 175 ton per day multi-purpose incinerator adjacent to the City of Stamford's Sewage Treatment Plant. The design criteria will utilize the research data which was developed through a recent Public Health Service grant to Mr. Elmer Kaiser, Senior Research Scientist, New York University and from information made available for the Detroit Special Waste Incinerator and DuPont Special Waste Incinerator. The design features will provide: (1) for operation under strict air pollution control requirements; (2) for burning of over-sized solid waste items such as logs, stumps, brush, demolition lumber, furniture, tires, plastics, automobile bodies and non-gradeable highly volatile liquid residues. Evaluation procedures of the incinerator's ability to handle these special wastes will develop or produce: (1) accurate measurements of weights and volumes of all special wastes; (2) rules and regulations governing the delivery of waste such as maximum size permissible; (3) descriptions of complex industrial wastes; (4) information on which wastes are compatible and non-compatible when burned together; (5) methods of charging the chamber; (6) operating temperatures; (7) draft measurements; (8) effectiveness of centrifugal and electrostatic dust interceptors; and (9) information on excess air requirements and stack emissions.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00018-01

Title: Land Reclamation By Accelerated Stabilization

Project Director: Ralph Stone, President
Ralph Stone & Co., Inc., Engineers
10954 Santa Monica Boulevard
Los Angeles, California

Amount & Year: $122,100 - 01 $98,825 - 02 $99,625 - 03

Started: June 1, 1966 Expected Finish: May 31, 1969

Objectives: The City of Santa Clara is proposing to demonstrate the feasibility of land reclamation by accelerated stabilization using aerobic high-rate and composting test cells. They intend to show that the resultant sanitary landfill will be free of methane and hydrogen gases, will have a reduction in the pollution of ground water reduction in solid waste disposal costs and an increase in solid wastes disposal capacity when compared to a conventional sanitary landfill.

Procedures: In the first phase of this project, the city of Santa Clara will construct, operate and compare conventional anaerobic sanitary landfills with two types of aerobic landfills (composting and controlled high-rate oxidation) in order to obtain their respective efficiencies in reclaiming land. Phase two will begin only if phase one has been successful. It will demonstrate a full scale aerobic landfill in actual operation and provide the city of Santa Clara with appropriate cost and land reclamation maintenance experience.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00019-01

Title: Jefferson Parish (Louisiana) West Bank Refuse Collection

Project Director: Ray E. Patron, Director of Garbage
912 David Drive
Metairie, Louisiana

Amount & Year: $28,007 - 01

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: To analyze the existing collection and disposal systems in the 4 garbage districts on the West Bank of Jefferson Parish and to evolve a plan for consolidating these districts into one central organization.

Procedures: The existing systems will be analyzed with regard to efficiency, economics and potential growth. Collection methods and routes, transfer stations, incineration, and landfill operations will be considered. Experienced consulting engineers will be used.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00020-01

Title: Recreational Use of Waste Incineration Heat

Project Director: Richard L. Nelson, Assit. Exec. Administrator
Bergen County Admin. Bldg.
Hackensack, New Jersey

Amount & Year: $300,000 - 01 $292,968 - 02 $23,067 - 03

Started: June 1966 Expected Finish: May 1969

Objective: To construct an incinerator so designed that it will be economical for solid waste disposal, acceptable from the standpoint of air pollution control when located in a recreation park area, and that it will service, through heat recovery, as a source of economical power for the operation of adjacent recreational facilities.

Procedures: A 600 ton/day incinerator would be constructed in a recreational park area. The design includes the incorporation of air pollution control and waste heat recovery devices. The unit would be evaluated to show the economics of operation, that it is acceptable in a park area, and that it furnishes a power source for the economical and efficient operation of adjacent recreational facilities such as a swimming pool and ice skating rink.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00021-01

Title: California Integrated Solid Waste Management System

Project Director: Frank M. Stead, Div. Of Environmental Sanitation
State Department of Public Health
2151 Berkeley Way
Berkeley, California

Amount & Year: $223,940 - 01 $178,687 - 02

Started: June 1, 1966 Expected Finish: May 31, 1968

Objective: To investigate, plan, and design a regional Solid Waste management system which can efficiently and economically handle all of the solid wastes of the area, and to implement, construct, test, and evaluate the designed system.

Procedures: The State Department of Health will conduct a systemized approach to the Urban-Rural Solid Waste Management problems of the Fresno Region. The actual investigation will be made by the Von Karman Center, Aerojet-General Corporation and Engineering-Science, Inc. The first objective of this study will be to develop a methodology that can be generalized and used in any region. They plan to develop a procedure for measuring the effectiveness of any proposed system in solving all problems created by solid wastes. They will then make an identification of the operating conditions (waste loads; geological, meteorological, hydrologic and technology and existing waste management practices) and conceptual designs of alternative systems. By incorporating this data into their evaluation and comparative programs they hope to recommend a solid waste management system that will alleviate current and future solid wastes problems in the Fresno Region.

Project Type: Study/Invest/Demon, Grant Agency No. 1-D01-SW-00026-01

Title: Paterson, Clifton, Passaic, Wayne Regional Solid Waste Program

Project Director: Frank P. Francia, President
Board of Public Works, City Hall
Paterson, New Jersey

Amount & Year: $75,000 - 01

Started: June 1, 1966 Expected Finish: May 31, 1967

Objectives: The primary objective of this project is to construct and operate a pilot operation which will demonstrate the most economical solution to their solid waste problems. To find this solution, they plan to evaluate the means, the procedures and the mechanics of handling and disposing of solid waste through regionalized facilities. Their findings and solution will be incorporated into the overall state plans.

Procedures: The existing systems will be analyzed and all known methods for disposing of solid wastes will be evaluated with respect to their particular area. In addition an inventory and quantitation of industrial and household refuse will be made.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00029-01A1

Title: Solid Waste Disposal Incinerator Prototype for Specialized Operations.

Project Director: E. F. Bannon
274 Middle Street
Bridgeport, Connecticut

Amount & Year: $272,506 - 01 $17,506 - 02

Started: December 1966 Expected Finish: November 1968

Objective: The project objective is to construct a modification and improvement of an experimental solid waste incinerator; to experimentally elicit information as to practicability and safety of said device; to determine the relative cost per ton of disposal; to determine the types and amounts of waste materials which can safely be disposed of; and to secure information as to the relative hazards of disposing of volatile and/or explosive substances which now must be buried.

Procedures: The City of Bridgeport, Connecticut, will demonstrate the feasibility of using two improved incinerators to combust materials which cannot be burned in conventional incinerators. A "Detroit" type brush burner will be modified to provide a heat exchanger mechanism to raise combustion temperatures. A special refractory lining will be installed to withstand those high temperatures. The second incinerator will be a modified "Dupont" open pit type. It will be improved by the addition of jets of hot air generated in the "Detroit" incinerator. It will have special refractory lining capable of withstanding a temperature of 3000°F. In the final system normal wastes will be burned in conventional and bulky demolition wastes, volatiles, and explosives in the "Dupont" incinerator. The economic practicability (by cost comparison) and the safety of this equipment will be investigated. Experiments will also be conducted to determine the most advantageous size and contour of the proposed pit, the angle of air propellent types, the quantity of air needed according to the type of waste, the most effective gas mixtures, the time needed to load, fire, and remove unconsumable waste, and the type of solid waste that cannot be handled.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00030-01

Title: Gainesville Compost Plant

Project Director: Houston, H., Director
Gainesville Metropolitan Waste
Conversion Corp. PO. Box 1026
Wheaton, Illinois

Amount & Year: $375,000 - 01 $832,320 - 02 $178,400 - 03

Started: June 1, 1966 Expected Finish: May 31, 1968

Objectives: To demonstrate a recently developed high-rate, mechanical composting system for the disposal of municipal garbage and trash from medium sized communities. It will also serve as a demonstration.

Procedures: A "Metropolitan" mechanical composting facility will be constructed to serve the City of Gainesville, the University of Florida, and Alachua County for a seven-year demonstration period. Municipal sludge will be incorporated into the municipal garbage and refuse. Fifteen per cent of the compost from the plant will be donated to the City and the University for agricultural and horticultural demonstration purposes. The remainder will be sold to amortize the bonds issued by the Authority for its share of the project.

Evaluation of the project will include complete cost analysis, product sales, demonstration procedures and arthropod and rodent control.

Project Type: Study/Invest/Demon. Grant Agency No. 2-D01-SW-00033-02

Title: San Jose/Santa Clara County Solid Waste Disposal Demonstration Project

Project Director: Raymond C. Miller, Director of Public Health
San Jose, California

Amount & Year: $58,500 - 01 $127,500 - 02

Started: January 1967 Expected Finish: December 1967

Objective: To undertake a study to show that a solid waste disposal system, which basically employs incineration, is feasible for accomplishing total solid waste disposal for counties or districts containing metropolitan areas.

Procedures: This study is a continuation of one which was funded for $39,000 for the period 6/1/66 through 12/31/66. The study consists of a systems analysis approach to develop a plan for handling all solid wastes produced in the San Jose Metropolitan area and the Santa Clara County. This analysis would include: (1) determination of solid waste situations in San Jose and all of Santa Clara County; (2) examination of salvage and by-product markets, and the various processes by which these products can be obtained; and (3) determination of functional specifications for disposal demonstration facilities for San Jose Metropolitan area and disposal requirements for all of Santa Clara County. Concurrently with the above, there will be undertaken a systems analysis of the legal, political, and social aspects for full-plan development.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00035-01

Title: Erie County Refuse Disposal Project

Project Director: Thomas C. West, Director
Div. Environmental Health
Erie County Department of Health
2101 Peach Street, Erie, Pennsylvania

Amount & Year: $34,000 - 01 $10,000 - 02

Started: June 1966 Expected Finish: May 1968

Objective: First Year: Evaluate existing solid waste collection and disposal operations in Erie County; and from findings propose refuse collection and disposal site system that would properly serve the County.

Second Year: Study the sociological problems connected with the adverse reactions of the population to the solid waste problem, and develop a public education program to overcome the attitude.

Procedures: The procedures used may be listed as follows: (1) A county-wide survey of each existing dump and landfill sites will be undertaken. (2) A county-wide survey to recommend location of new and suitable landfill sites will be undertaken. (3) Existing methods of collection relative to haul distances will be evaluated. (4) The two existing City of Erie incinerators will be evaluated. (5) The cost, method of payment, and rate schedule of future programs will be estimated. (6) A questionnaire designed to determine a residents knowledge of and attitudes toward solid waste disposal methods will be distributed. (7) An educational program based on the results of the previous survey will be established. (8) Literature and mass media information on solid waste disposal methods will be disseminated.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00036-01

Title: Oklahoma County (Oklahoma) Solid Waste Disposal Study

Project Director: D. C. Clevland, Director
Division of Environmental Health
City-County Health Department
331 West Main St., Oklahoma City, Oklahoma

Amount & Year: $20,650 - 01 $20,650 - 02 $20,650 - 03

Started: June 1, 1966 Expected Finish: May 31, 1969

Objective: To prepare a long-range plan for the collection and disposal of solid wastes to serve Oklahoma County and the adjacent high density areas.

Procedures: (1) Study existing legislation and promote permissive legislation if area or district solid waste collection and disposal systems are not permitted; (2) Prepare a long-range plan for collection and disposal of solid wastes; and (3) Conduct the study and investigation with a sanitarian on the County's staff plus a consultant, such plan to include collection routes, disposal sites, and transfer stations.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00038-01

Title: Incinerator No. 5 Phase I - Special Studies - Washington, D. C.

Project Director: William F. Young, Chief
Project Development & Engineering Branch
Department of Sanitary Engineering
District of Columbia

Amount & Year: $94,203 - 01

Started: June 1, 1966 Expected Finish: May 31, 1967

Objective: To determine the feasibility and cost of incorporating certain features into the design and construction of a proposed 800 TPD incinerator (Incinerator #5). This project includes the study and investigation of: (a) Air Pollution Control; (b) Heat Recovery; (c) Metal recovery; (d) Control Laboratory; (e) Chipper Installation, and (f) Compression Press.

Procedures: A demonstration incinerator will be built within the District of Columbia and will be operated by the Department of Sanitary Engineering. Six separate but related studies will be made of this facility. These studies will include:

Air Pollution Control - The effect of certain incinerator variables on the type and quantity of atmospheric contamination and the contaminate effect on air pollution control equipment will be studied.

Heat Recovery - Refuse fuel variables and characteristics of certain equipment will be studied.

Metal Recovery - Recovery of metals before incineration and ferrous metals after incineration.

Control Laboratory - Available appropriate laboratory and monitoring equipment will be studied.

Chipper Installation - Investigate various types of chipper equipment for reduction of large combustible materials.

Compression Press - Various types of presses for reducing the volume of non-combustibles will be determined.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00039-1

Title: Maricopa County-wide Solid Waste Disposal

Project Director: Joseph Weinstein, Director
Division Environmental Health Services
1825 E. Roosevelt, Phoenix, Arizona

Amount & Year: $45,000 - 01 $21,000 - 02 $21,000 - 03

Started: December 1966 Expected Finish: November 1969

Objective: The project objective is to review current solid wastes disposal practices in Maricopa County; to appraise the influence and interrelationship of the currently employed disposal systems on one another; to appraise the serviceability of these systems to the county as a whole, and to develop a county-wide solid waste disposal plan by which the county might develop methods and techniques to be used and establish a timetable for putting the plan into effect.

Procedures: A qualified consulting engineer will be responsible for attaining a majority of the objectives listed. Personnel of the County Health Department will make supplementary surveys of the availability and suitability of certain land for landfill services. The type and quantity of solid wastes now being produced in the county will be determined. The type of disposal practiced in the separate communities including sanitary landfill, dumps, animal feeding, incineration, and composting will be noted. The population and the waste production for the year 2000 will be projected. An analysis of possible solutions to solid waste disposal problems will be made, including area needed, location, and cost of landfills; the same analysis for incinerators; and an estimate of the probable place of composting in solid waste disposal.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00045-1

Title: Building an Amphitheater and Coasting Ramp with Municipal Refuse

Project Director: Charles S. Kiley, Director Public Works
City of Va. Beach, 18th & Arctic Avenue,
Virginia Beach, Va.

Amount & Year: $180,300 - 01 $53,288 - 02 $55,424 - 03

Started: January 1967 Expected Finish: December 1969

Objective: The city of Virginia Beach, Virginia proposes to demonstrate the feasibility of constructing a hill or vertical sanitary landfill out of municipal refuse. The project is designed to take three years, and upon completion the resulting hill - 60 feet high consisting of densely compacted refuse - will take the form of an amphitheater and coasting ramp. Cover material will be obtained from a pit which will be allowed to fill with water to form a lake. The final hill will be covered with vegetation to prevent erosion.

Procedures: The project site area will be thoroughly surveyed and prepared. The land where the fill is to be placed will be evacuated to a depth somewhat above ground water and a standard sanitary landfill will be started. A four-foot layer of refuse will be placed, compacted, and covered each day with a 6-inch layer of earth. When earth from the original cut is used up, earth from a borrow pit will be utilized. When the project is completed, this pit will be allowed to fill with water to form a lake. Top soil will be piled separately for use as a final cover material. This material will be placed on the side slopes and covered with vegetation as the fill rises. Commencing with this project, a nursery will be started to grow plants which will be used to fix the banks. The fill will be shaped so that at completion an amphitheater and coasting ramp will be created. This project has been designed to dispose of the refuse from a city of about 150,000 population for a period of about three years.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00046-1

Title: Development of Construction and Use Criteria for Sanitary Landfills

Project Director: John A. Lambie, County Engineer
County Engineering Bldg.
108 West Second Street, Los Angeles, Calif.

Amount & Year: $90,500 - 01 $110,000 - 02 $94,000 - 03

Started: January 1967 Expected Finish: December 1969

Objective: This project is designed to satisfy the following three objectives with respect to design and operation of sanitary landfills; (1) The development of methods to control gas movements from existing and new landfills; (2) The development of methods to control leachate discharging from existing and new landfills; and (3) The development of a "Code" for use in controlling construction of buildings on completed sanitary landfills.

Procedures: The procedures to be used during the course of this project are the following: First Year - Provide solutions to the problem of decomposition gas movement from sanitary landfills into surrounding soil and groundwaters. These solutions will be the result of studies of (1) gas flow measurements (2) geologic configurations (3) soil properties (4) subsidence rates and (5) gas control devices. Second Year - Continue to investigate subsidence in sanitary landfills. The investigations will include (1) a review of subsidence data obtained from other on-going solid waste disposal projects (2) surveys of existing structures located on landfills in Los Angeles and San Francisco areas (3) Evaluation of settlement data (4) studies of the effects of settlement on structures, utilities, and roadbeds, and (5) Recommendation for construction of above facilities on sanitary landfill sides. Third Year - The findings from the first and second years will be combined and evaluated to provide specific design and construction guidelines for sanitary landfills in urbanized areas. Solutions to subsidence problems will be developed, pilot experiments to demonstrate the advantages of volume reduction prior to landfilling will be conducted, salvage of materials will be studied, and a control and inspection system for landfill operations will be formulated. Throughout the study, specific proposals for demonstration projects will be formulated.

Project Type: Study/Invest/Demon. Grant Agency No. D01-SW-00048-01

Title: Use of Abandoned Strip Mines For Solid Waste Disposal in Maryland

Project Director: Wilfred H. Shields, Jr., Acting Chief
Division of Solid Wastes
Maryland State Department of Health
301 W. Preston, St., Baltimore, Maryland

Amount & Year: $43,178 - 01 $75,581 - 02 $72,561 - 03

Started: November 1966 Expected Finish: October 1969

Objective: To determine the feasibility of using abondoned strip mines for landfills.

Procedures: (a) To determine correct procedures, equipment requirements, and other desirable operational techniques for efficient year-round utilization of abandoned strip mines for solid waste disposal; (b) determine any special precautions needed to prevent ground or surface wastes pollution caused by water leaching through the fill; (c) determine the effect of sanitary landfill operations on acid formation; (d) determine the unit costs for disposal of solid waste; (e) determine the unit capacity of strip mine landfills when used for disposal of solid wastes; (f) locate and estimate capacity of strip mines in Maryland suitable for waste disposal and (g) determine the effects of combining sewage sludge and solid waste disposal in the pit landfill.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00050-01

Title: Evaluation of Alternatives in Refuse Disposal-City of Raleigh, North, Carolina

Project Director: Warren J. Mann, Director
Department of Public Works
Room 307, Municipal Bldg., Raleigh, North Carolina

Amount & Year: $41,718 - 01 $41,718 - 02 $41,718 - 03

Started: January 1967 Expected Finish: December 1969

Objective: The study has the following objectives: (1) Application of existing mathematical simulation model to city refuse collection to improve its efficiency; (2) application of mathematical model to landfill site selection; (3) extend applied mathematical model to evaluate regional solid waste management; (4) develop methods to maximize salvage benefits by choice of disposal method.

Procedures: The Quon, Charmes and Wersan simulation model of a refuse collection system will be tested and applied to the refuse collection system of the City of Raleigh to identify cost saving procedures in the collection of the City's waste. A second model developed by Wersan, will be tested for application to disposal site selection for the city's wastes. The origin and composition of wastes will be studied. A survey of available markets for recoverable materials will be made. Reasons for failure of abandoned incinerators will be sought. The elements of a multiple-method disposal system will be examined.

Project Type: Study/Invest/Demon. Grant Agency No. 1-D01-SW-00053-01

Title: County-wide Sanitary Landfill Refuse Disposal Project - Broome County, N. Y.

Project Director: Rolan M. Austin, 62 Water Street
Binghamton, New York

Amount & Year: $42,000 - 01

Started: November 1966 Expected Finish: October 1967

Objective: Techniques, procedures and feasibility of financing, establishing and operating a County-wide refuse program requiring the integration of numerous problems presently operated by large and small units of government will be demonstrated.

Procedures: The County has previously determined that a sanitary landfill with transfer stations is the most economical disposal method. They intend to (1) authorize a County tax to establish, operate and maintain a County-wide refuse disposal program; (2) plan, equip and operate a sanitary landfill; (3) evaluate conditions to handle refuse from a combination of large urban areas and small communities; and (4) develop and use educational material and information to help stimulate support for County-wide refuse disposal programs.

BIBLIOGRAPHIC DATA SHEET	1. Report No.	2.	3. Recipient's Accession No. PB-260 038
4. Title and Subtitle Demonstration Project Abstracts, Solid Wastes Program.			5. Report Date Mar 67 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address National Center for Urban and Industrial Health, Chevy Chase, Md. Solid Wastes Program.			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstracts Projects described in these abstracts have received awards made by the Solid Wastes Program of the Public Health Service's National Center for Urban and Industrial Health. The projects are of two kinds. Some are designed to demonstrate the feasibility of new and improved technology for solid waste disposal. Others are to investigate the development of area-wide solid waste management systems to replace unsanitary and uneconomic operations by individual communities. The Solid Wastes Program is aimed at initiating across the nation the adoption of practices and systems for disposing of solid wastes which protect human health and scenic beauty.

17. Key Words and Document Analysis. 17a. Descriptors

17b. Identifiers/Open-Ended Terms

Solid waste disposal
Waste processing
*Waste management
*Solid waste treatment
Solid waste collection treatment
Refuse disposal
Incineration
Land reclamation
Earth fills

17c. COSATI Field/Group 13B

18. Availability Statement	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 32
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